from Captain Kater's experiments, to consist in placing it in the magnetic meridian, joining the opposite poles of a pair of bar magnets, (they being in the same line,) and laying them flat upon the needle, with their poles upon its centre; then, having elevated the distant extremities of the magnets, so that they may form an angle of about 2° or 3° with the needle, they are to be drawn from the centre to its extremities, carefully preserving the same inclination; and having joined the poles of the magnets at a distance from the needle, the operation is to be repeated ten or twelve times upon each surface.

In needles from five to eight inches long, their weights being equal, Captain Kater found their directive forces nearly as the lengths; but in needles of nearly the same length and form, the directive force is as the mass, and not dependent upon the extent of surface.

Lastly, the author ascertained that the deviation of a compass needle, occasioned by the attraction of soft iron, depends, as Mr. Barlow has advanced, upon extent of surface, and is wholly independent of the mass; excepting that a thickness of the iron, amounting to about two tenths of an inch, is requisite to the complete development of the attractive energy.

Notice respecting a Volcanic Appearance in the Moon. In a Letter addressed to the President. By Captain Henry Kater, *F.R.S.* Read February 8, 1821. [*Phil. Trans.* 1821, *p.* 130.]

This volcano was first observed by Captain Kater on Sunday the 4th of February, the moon being then two days old, with a Newtonian telescope of $6\frac{1}{4}$ inches aperture, and a power of 74. The position of the volcano is shown in an annexed drawing; its appearance was that of a small nebula, subtending an angle of 3 or 4 seconds, and its brightness very variable.

It was again observed on the evenings of the 5th and 6th, but was then more faint, though occasionally exhibiting the appearance of a luminous point, like a star of the 6th or 7th magnitude. Captain Kater thinks that the distance of the volcano from the edge of the moon was about one tenth of her diameter; and the angle which it formed with a line joining the cusps on the last-mentioned evening, was about 50°. On the 7th it was scarcely visible, in consequence, probably, of the increased light of the moon.

A Further Account of Fossil Bones discovered in Caverns inclosed in the Lime-stone Rocks at Plymouth. By Joseph Whidbey, *Esq. In a Letter addressed to Sir* Everard Home, *Bart. V.P.R.S.* Read February 8, 1821. [*Phil. Trans.* 1821, *p.* 133.]

These bones were found not far from those previously described by Mr. Whidbey, and in a similar situation; the cavern being entirely inclosed in the surrounding rock, and without the smallest appearance of any communication ever having existed with the sur-

face. There were no stalactites in this cavern, as there generally is in those which contain no bones, and it was perfectly dry and free from rubbish.

From a note annexed to this letter by Sir Everard Home, the bones alluded to appear to be the grinder of the upper jaw of the single-horned rhinoceros. Two grinders, two tusks, and portions of two tibiæ of the brown or black bear; and portions of bones of an animal of the deer kind.

These specimens are deposited in the Museum of the College of Surgeons.

On the Aëriform Compounds of Charcoal and Hydrogen; with an Account of some Additional Experiments on the Gases from Oil and from Coal. *By* Willian Henry, *M.D. F.R.S. &c.* Read February 22, 1821. [*Phil. Trans.* 1821, *p.* 136.]

In this paper, after adverting to the sources, properties, and composition of carburetted hydrogen obtained from stagnant water, and of olefiant gas procured from the decomposition of alcohol; and after examining the agency of chlorine upon these compounds; the author proceeds to examine the gas procured by the decomposition of oil and of coal at high temperatures. The former, or oil gas, is shown to vary considerably in composition and properties, according to the temperature at which it is procured; and though no temperature short of ignition is sufficient for the decomposition of oil into permanent combustible gases, yet the lower the heat the more combustible is the gas, and better suited to artificial illumination.

In analysing these gases, Dr. Henry always found them mixtures of olefiant, carburetted hydrogen, hydrogen, and carbonic oxide gases. Dr. Henry separated the first by the action of chlorine, and from the detonation of the residue with oxygen, as compared with an artificial mixture of known composition, he ascertained the relative proportions of its components.

It appears from the tables exhibiting these results, that in oil gas the proportion of carbonic oxide is greater than in that from coal, but that carburetted hydrogen is most abundant in the latter. The proportion of hydrogen appears to increase in both as they are formed at higher temperatures, and is always greatest in the latter portions of coal gas; but Dr. Henry never found that either oil or coal gas, after the action of chlorine with the exclusion of light, presented a residue of pure hydrogen.

In the concluding section of this paper, the author details some experiments which led him to consider that portion of oil gas which is condensible by chlorine, not as mere olefiant gas, but as a peculiar compound, requiring nearly two volumes of oxygen more for its combustion than an equal quantity of olefiant gas, and affording one additional volume of carbonic acid; he therefore thinks that it must be considered either as containing a new compound of carbon and